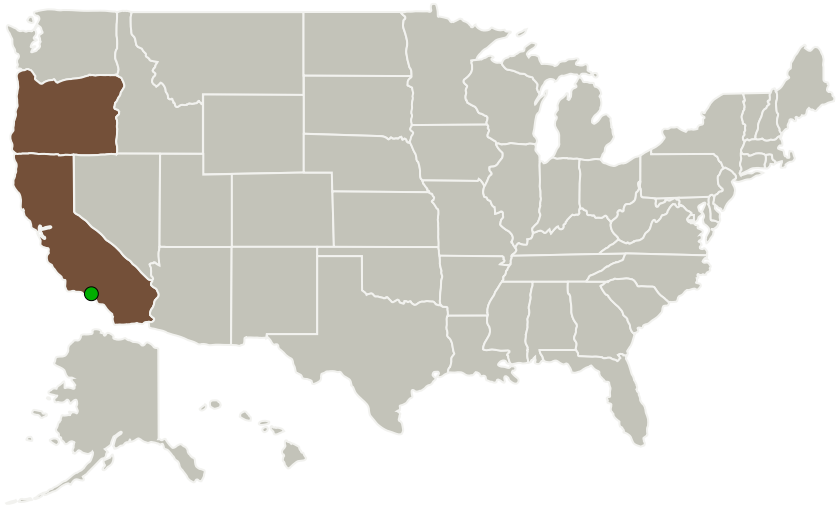
Ka-Band Klystron Amplifier for CUBESATs, Phase I

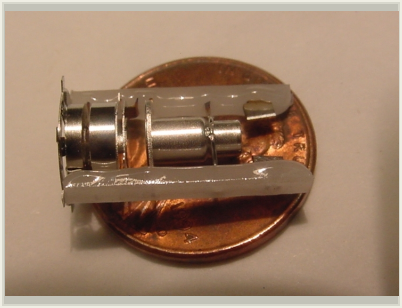
Completed Technology Project (2016 - 2016)

Project Introduction

We propose a Ka-Band klystron amplifier for use in CubeSats. It will operate at 35.7 GHz, have 400 MHz of bandwidth, and output at least 32 watts of saturated power. Small signal gain will exceed 35 dB. In its final form, it will occupy a space 0.4-inch diameter and less than 0.5-inch in length. The combination of small size, high power, and high frequency obviate the use of solid state power amplifiers. Klystrons are the only technology that can be miniaturized to this degree. We propose an innovative construction technology that involves electrostatic focusing, glass insulator fastening of tube elements, a telescoping collector, and a highly loaded scandate cathode with integral focus electrode capable of 50 A/cm2. In Phase I we will build full performance prototypes. e beam inc. is the world's leader in innovative miniature cathode assemblies, electron guns, and vacuum electron devices generally. It has long promoted the transfer of cathode ray tube construction technology to other devices as a way to reduce size, mass, and cost. It has successfully done this with microwave amplifiers, terahertz mass spectrometers, and x-ray tubes. Some of these designs have been deployed in space.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
e-beam, Inc.	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Beaverton, Oregon
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Oregon

Project Transitions

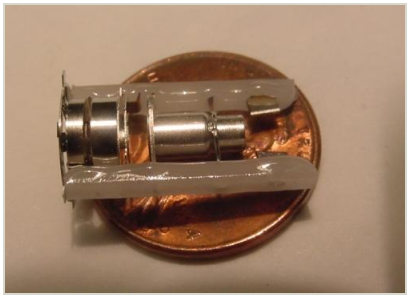
June 2016: Project Start

December 2016: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139590)*

Images



Briefing Chart Image
Ka-Band Klystron Amplifier for CUBESATs, Phase I
(https://techport.nasa.gov/image/136330)

Final Summary Chart Image
Ka-Band Klystron Amplifier for CUBESATs, Phase I Project Image
(https://techport.nasa.gov/image/133422)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
e-beam, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

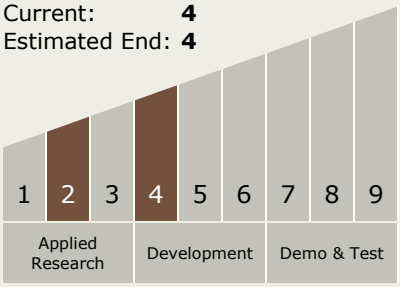
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Bernard K Vancil

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System